

ruined. The hail-belt was about one half of a mile in width, and extended from northwest to southeast.

**Minnesota.**—Lake Benton, Lincoln county: the hail storm of the evening of the 19th was one of the severest that has ever visited this section. A number of farmers in this locality sustained heavy losses, their crops being badly damaged, and in some instances fields of grain were entirely destroyed.

**Nebraska.**—Johnson, Nemaha county: at 12.30 p. m. of the 13th a very destructive hail storm occurred in this county. The path of the storm was about two miles in width and seven miles in length. The damage to crops in this locality is estimated at \$20,000. The hailstones varied from one-eighth to three-fourths of an inch in diameter, were very hard and of irregular shapes.

**Louisville, Cass county:** a very severe hail storm occurred at this place on the 13th. Window-glass was broken in nearly every house in the town. Crops in the locality were completely ruined.

**Austin, Sherman county:** hail storms occurred at this place on the 11th and 15th, causing damage to crops.

**New Jersey.**—Ocean Beach: a severe hail and wind storm passed over this place during the night of 12th–13th, breaking many windows and causing other damage. A large barn was demolished and several buildings were unroofed.

**New York.**—Albany: a severe hail storm passed over this place during the night of the 12–13th, doing great damage to crops and fruit trees, and breaking many windows.

**Pennsylvania.**—Lancaster, Lancaster county: reports from various parts of this county show that the hail storm of the night of the 28th–29th destroyed more than 1,000 acres of growing tobacco.

**Wisconsin.**—Eau Claire, Eau Claire county: a severe hail and thunder storm occurred in this vicinity on the afternoon of the 3d, doing great damage to buildings, crops, etc. The storm was especially severe in the vicinity of New Chicago and Mondovi; at the latter place five barns were destroyed.

Hail storms of less severity occurred in the various states and territories as follows:

**Arizona.**—Fort Bowie, 26th; Fort Grant, 31st.

**Arkansas.**—Little Rock, 4th and 8th.

**Colorado.**—Fort Lewis, 3d; Pike's Peak, 4th; Fort Garland, 21st.

**Dakota.**—Fort Yates, 10th and 15th; Yankton, 15th; Deadwood, 22d; Bismarck, 23d.

**Georgia.**—Atlanta, 24th; Brunswick, 26th.

**Illinois.**—Morrison, 11th; Riley, 21st.

**Indiana.**—Logansport, 4th; Indianapolis, 12th.

**Iowa.**—Independence, 12th; Cresco, 15th and 18th; Monticello and Davenport, 20th.

**Kansas.**—Topeka, 10th.

**Maine.**—Gardiner, 31st.

**Michigan.**—Thornville, 3d; Swartz Creek, 4th; Fort Brady, 11th; Ionia, 16th; Lansing, 21st.

**Montana.**—Fort Keogh, 6th.

**Nebraska.**—Marquette, 12th; Genoa, Fremont, and Red Willow, 13th.

**New Hampshire.**—Grafton, 4th; New Market, 4th and 5th; Mount Washington, 29th, 30th, and 31st.

**New Mexico.**—Fort Cummings, 12th; Fort Union, 15th; Fort Wingate, 18th.

**New York.**—Factoryville, 2d and 3d; Menand station (near Albany), 12th.

**North Carolina.**—Lenoir, 28th.

**Pennsylvania.**—Wellsboro', 2d; Leetsdale and Grampian Hills, 23d.

**Tennessee.**—Austin, 2d; Nashville, 3d and 24th.

**Wisconsin.**—Ripon, 2d; Sussex, 16th; Neillsville, 21st; Beloit, 22d.

#### SNOW.

Snow fell on the summit of Pike's Peak, Colorado, on the following dates: 4th, from 6th to 9th, 13th, 14th, 15th, 27th. The

total depth of snowfall for the month was about twenty-three inches, of which amount more than eighteen inches fell during the snow storm of the 6th and 7th. At the end of the month the snow had not entirely disappeared from the ground.

The "Lancaster (New Hampshire) Republican," of August 1st, states that, during last week, Colebrook (Coos county) was visited by quite a heavy hail and snow storm. The area over which the storm prevailed was only about one mile in width, and two miles in length. Snow fell to a depth averaging nearly six inches.

#### SLEET.

Sleet fell on the summit of Pike's Peak, Colorado, on the 4th, 5th, 9th, and 24th.

Table of rainy and cloudy days, relative humidity, and dew-point for July, 1883.

Districts.	Rainy days.	Cloudy days.	Rel. humidity.*	Dew-point.
			Percentages.	°
New England.....	From 8 to 14	From 1 to 5	From 70.8 to 82.2	From 52.9 to 63.9
Middle Atlantic states.....	" 6 " 18	" 1 " 6	" 60.2 " 81.7	" 59.1 " 69.3
South Atlantic states.....	" 8 " 18	" 1 " 12	" 60.8 " 81.5	" 63.8 " 76.7
Florida peninsula.....	" 10 " 15	" 1 " 4	" 69.4 " 73.9	" 73.0 " 74.4
East Gulf.....	" 9 " 15	" 0 " 2	" 65.1 " 76.0	" 68.3 " 73.5
West Gulf.....	" 4 " 14	" 1 " 5	" 66.4 " 78.7	" 69.9 " 74.6
Tennessee.....	" 14 " 18	" 2 " 8	" 63.6 " 75.9	" 63.8 " 69.2
Ohio valley.....	" 11 " 15	" 4 " 6	" 64.0 " 70.7	" 60.1 " 65.1
Lower lakes.....	" 13 " 23	" 3 " 9	" 66.9 " 75.9	" 58.3 " 61.3
Upper lakes.....	" 11 " 21	" 5 " 9	" 65.4 " 80.3	" 50.9 " 60.2
Extreme northwest.....	" 10 " 14	" 3 " 4	" 60.9 " 75.0	" 50.1 " 55.3
Upper Mississippi valley.....	" 11 " 17	" 4 " 10	" 67.2 " 71.5	" 59.0 " 63.3
Missouri valley.....	" 11 " 14	" 4 " 7	" 66.1 " 75.8	" 56.9 " 64.6
Northern slope.....	" 3 " 12	" 0 " 5	" 38.5 " 64.5	" 35.6 " 58.6
Middle slope.....	" 5 " 15	" 5 " 9	" 41.3 " 59.1	" 45.6 " 59.7
Southern slope.....	" 3 " 9	" 2 " 5	" 61.6 " 63.8	" 59.9 " 62.9
Southern plateau.....	" 2 " 21	" 0 " 7	" 45.9 " 60.4	" 52.2 " 56.7
Northern plateau.....	" 0 " 1	" none	" 33.4 " 43.8	" 42.2 " 45.1
North Pacific.....	" 0 " 3	From 0 " 1	" 55.0 " 62.2	" 48.4 " 52.7
Middle Pacific.....	" none	" 0 " 7	" 33.1 " 90.4	" 49.1 " 56.3
South Pacific.....	From 1 " 6	" 0 " 1	" 51.0 " 72.8	" 59.3 " 69.5
Mt. Washington, N. H.....	Fourteen	Four	70.8	59.2
Pike's Peak, Col.....	Nineteen	One	71.7	29.8
Salt Lake City, Utah.....	Six	Two	31.7	42.1

\* Relative humidity corrected for altitude.

#### COTTON REGION REPORTS.

Temperature and rainfall observations were continued during the month of July, 1883. The averages for the various districts are determined from observations taken at the stations, as shown on chart vi., issued with the REVIEW for April, 1882. For the purpose of comparison, the averages for July, 1883, with the departures, are also given in table below.

It will be seen from this table, that the rainfall for July, 1883, when compared with that of July, 1882, shows large deficiencies in nearly all districts. The means of the maximum temperatures have been higher in all districts, except for the district of Galveston, where there is no change; and the means of the minimum temperatures have also been higher in all districts, except for the district of Little Rock, where it is 1° 5 lower.

Meteorological Record of the Cotton Districts for the months of July, in 1882 and 1883.

Districts.	Rainfall in inches.			Temperatures.						Extremes for July, 1883.	
				Mean of the maxima.		Change.	Mean of the minima.		Change.		
	1882.	1883.	Deficiency.	1882.	1883.		1882.	1883.		Max.	Min.
New Orleans.....	8.30	3.30	— 5.00	90.4	93.2	+ 2.8	71.3	74.4	+ 3.1	104	62
Savannah.....	6.21	3.42	— 2.79	91.0	95.7	+ 4.7	70.3	72.7	+ 2.4	107	55
Charleston.....	7.28	4.40	— 2.88	90.9	94.6	+ 3.7	68.0	72.1	+ 4.1	104	53
Atlanta.....	5.45	1.24	— 4.21	87.9	93.2	+ 5.3	67.6	69.4	+ 1.8	102	47
Wilmington.....	4.90	3.16	— 1.74	90.2	93.2	+ 3.0	67.7	70.2	+ 2.5	105	60
Memphis.....	5.45	4.00	— 1.45	88.0	91.4	+ 3.4	67.1	68.3	+ 1.2	101	57
Galveston.....	3.74	2.15	— 1.59	94.0	94.0	0.0	71.3	73.7	+ 2.4	104	50
Vicksburg.....	10.30	3.48	— 6.82	89.4	92.2	+ 2.8	69.0	72.3	+ 3.3	99	61
Montgomery.....	5.18	1.65	— 3.53	88.6	95.3	+ 6.7	67.1	69.8	+ 2.7	101	53
Augusta.....	4.93	1.94	— 2.99	90.0	94.5	+ 4.5	69.2	72.7	+ 3.5	107	58
Little Rock.....	3.08	2.39	— 0.69	89.2	94.2	+ 5.0	66.0	64.9	— 1.5	101	49
Mobile.....	6.06	1.37	— 4.69	90.5	97.4	+ 6.9	68.7	71.0	+ 2.3	107	59

#### WINDS.

The prevailing directions of the wind for the month of July, 1883, are shown on chart iii., by arrows flying with the wind. East of the Mississippi river the prevailing winds were, with

but few exceptions, from the southwest; in the southern slope and Missouri valley, they were mostly from the south; in the extreme northwest, northern slope, and on the California coast, they were from the west and northwest; in Oregon, they were from north and northwest.

#### HIGH WINDS.

The following wind velocities, of fifty miles or more per hour, have been reported:

On the summit of Mount Washington, New Hampshire, 52 w., 1st; 80 w., 2d; 68 nw., 3d; 76 w., 4th; 60 nw., 5th; 56 nw., 6th; 70 w., 7th; 52 w., 12th; 52 w., 18th; 66 w., 22d; 80 w., 23d; 60 nw., 24th; 52 nw., 28th; 56 nw., 30th; 60 nw., 31st.

Nashville, Tennessee, 61 e., 5th.

Bismarck, Dakota, 56 w., 13th.

Fort Buford, Dakota, 54 w., 13th.

Delaware Breakwater, Delaware, 52 w., 8th.

Fort Assinniboine, Montana, 52 nw., 2d

Portsmouth, North Carolina, 52 w., 25th.

#### TOTAL MOVEMENTS OF THE AIR.

[In miles.]

In the following table are given the stations reporting the largest and smallest total movements of the air in each of the various districts:

Districts.	Stations reporting largest.	Miles.	Stations reporting smallest.	Miles.
New England.....	Block Island, R. I.....	9,500	New London, Conn.....	3,900
Middle Atlantic states.....	Sandy Hook, N. J.....	9,901	Lynchburg, Va.....	1,977
South Atlantic states.....	Hatteras, N. C.....	11,055	Augusta, Ga.....	2,583
Florida peninsula.....	Cedar Keys.....	6,524	Sanford.....	3,483
East Gulf.....	Pensacola, Fla.....	5,336	Montgomery, Ala.....	3,347
West Gulf.....	Indianola, Tex.....	7,908	Fort Smith, Ark.....	2,640
Ohio valley.....	Louisville, Ky.....	5,131	Indianapolis.....	3,294
Tennessee.....	Nashville.....	3,850	Chattanooga.....	3,767
Lower lakes.....	Buffalo, N. Y.....	7,207	Cowego, N. Y.....	4,980
Upper lakes.....	Milwaukee, Wis.....	8,007	Escanaba, Mich.....	5,354
Extreme northwest.....	Fort Buford, Dak.....	6,308	Saint Vincent, Minn.....	4,343
Upper Mississippi valley.....	Saint Louis, Mo.....	6,831	Dubuque, Ia.....	3,962
Missouri valley.....	Huron, Dak.....	6,259	Omaha, Neb.....	2,448
Northern slope.....	Fort Assinniboine, Mon.....	8,011	Deadwood, Dak.....	2,749
Middle slope.....	Fort Elliott, Tex.....	8,421	Fort Elliott, Tex.....	4,664
Southern slope.....	Fort Stockton, Tex.....	8,352	Fort Concho, Texas.....	6,929
Southern plateau.....	Fort Grant, Ariz.....	4,756	El Paso, Tex.....	3,356
Northern plateau.....	Dayton, Wash.....	4,537	Lowiston, Idaho.....	2,077
North Pacific.....	Portland, Oregon.....	3,447	Olympia, Wash.....	726
* Middle Pacific.....	San Francisco, Cal.....	9,158	Red Bluff, Cal.....	3,902
South Pacific.....	Yuma, Arizona.....	5,028	Los Angeles, Cal.....	4,062

\* No record at Cape Mendocino, Cal

On the summit of Mount Washington, New Hampshire, the total movement of the air for the month was 22,380 miles.

#### LOCAL STORMS.

**Arkansas.**—Eureka Springs, Carroll county: a very heavy rain storm occurred at this place on the 14th, seriously damaging the growing crops. Several houses and barns were blown down, and many others were damaged to a more or less extent.

**Connecticut.**—New Haven: a violent squall of wind and rain passed over this station at 5.40 p. m., of the 2d, doing considerable damage in the suburbs of the city. The storm was accompanied by hail, which destroyed a large quantity of window-glass.

New London, 2d: a storm of unusual severity occurred at this place on the evening of the 2d. The most violent part of the storm was of about five minutes duration, during which time many trees in this city, which have withstood the storms of a century, were uprooted, and the streets were blockaded with debris. Several barns in the suburbs of the city were blown down. Reports from Waterbury, Norwich, Middletown, and Niantic indicate that the course of this storm was about forty-five miles in length, with an average width of from six to eight miles.

Hartford: the storm of the afternoon of the 2d passed south of this city, doing much damage to towns along the river and sound.

Waterbury: the severest storm that has visited this place for several years occurred on the afternoon of the 2d. Several

large trees were uprooted and the streets were strewn with broken branches. Many windows were broken by the hail.

**Dakota.**—Aurora, Brookings county: a heavy hail and wind storm visited the northeastern part of this county on the night of the 12–13th. The corn and grain fields were badly damaged by hail. The storm pursued a southeasterly course, crossing the state line near Lake Benton, Minnesota.

Huron: a severe storm occurred on the 13th at points about fifteen miles south and southwest of here. Small houses, barns, &c., were destroyed. On the 18th a destructive storm occurred, which in some places was accompanied by large hail; much damage was done by lightning during the storm.

Bismarck: at 6 p. m. of the 13th a very severe wind storm occurred, which continued for about one hour and thirty minutes; the wind reached a velocity of sixty miles per hour.

Fort Yates: a violent wind storm occurred at this place on the evening of the 13th, causing slight damage.

**Florida.**—Jacksonville, 8th: a heavy thunder storm occurred on this date, during which considerable damage was caused by lightning.

Saint Augustine: a violent northeasterly storm occurred on the 18th, damaging fencing, trees, &c.

**Illinois.**—Joliet, Will county: the wind and rain storm which passed over this vicinity on the afternoon of the 7th was one of the most destructive storms ever known here. Many barns, dwellings, and fences in this county were blown down, and large numbers of trees were prostrated. On the evening of the 23d this place was visited by a violent thunder storm, during which several buildings were struck by lightning.

Clinton, De Witt county: a severe storm of wind and hail visited this place during the night of the 12–13th. Reports from the western part of De Witt and Logan counties state the corn crop was badly damaged by hail.

Geneseo, Henry county: during the night of the 12–13th, a heavy storm of wind and rain passed through Loraine township. Several barns were blown down, and outbuildings, corn-cribs, &c., were demolished. Many fields of corn and grain within the path of the storm, which was about four miles wide, were completely destroyed. The damage sustained by the farmers is estimated at from \$25,000 to \$35,000.

Atlanta, Logan county: a very heavy rain and hail storm occurred on the night of the 12–13th, which did great damage to the growing crops in this locality.

Avon, Fulton county: the hail storm of the night of the 12–13th completely ruined the crops northeast of this place. The path of the storm was about two miles in width and about five miles in length.

Rock Island, Rock Island county: the town of Cordova in this county was visited by a violent wind and rain storm on the night of the 12–13th. The crops in that vicinity were badly damaged, and many buildings were unroofed.

Gibson City, Ford county: at 10 p. m., of the 12th, this place was visited by a violent storm, which blew down the upper walls of the new opera house, and caused other damage, entailing a loss of \$5,000.

Carlinsville, Macoupin county, 13th: a heavy storm of wind and rain passed over this section this afternoon, causing a large amount of damage to the growing crops and to other property.

Peoria: buildings and trees in this locality were damaged to the extent of from \$3,000 to \$4,000 by the storm of the afternoon of the 13th. Several persons were injured.

Belleville, Saint Clair county: a number of houses were more or less seriously injured at this place during the storm of the 13th.

Alton, Madison county, 13th: during the storm of this date three churches were partly unroofed, other buildings injured, and the streets strewn with fallen trees.

East Saint Louis, Saint Clair county: the storm of the evening of the 13th caused considerable damage by blowing down trees, chimneys, &c. A train of twenty-five cars was blown from the track while opposite the Chicago and Alton depot, and nearly all of them were completely or partly wrecked. In

surrounding localities much damage was done to fences, barns, and other outbuildings.

Olney, Richland county: at 8.30 p. m., of the 13th, a severe wind and rain storm passed over this city. Several buildings were injured, and hundreds of shade trees were blown down.

Carmi, White county: a tornado struck the southern part of this city at 8.30 p. m., of the 13th, and destroyed a few small buildings.

Sumner, Lawrence county: one of the severest storms that has ever visited this locality occurred at 8.30 p. m., of the 13th. The Sumner Milling company's flouring mill was unroofed, and a large amount of damage was done to the machinery by the heavy rain. Numerous other buildings were damaged to a greater or less extent.

Mitchell, Madison county: a heavy storm of wind and rain passed over this place on the evening of the 13th. Outbuildings were destroyed, orchards stripped of fruit, and the wheat shocks scattered.

Roodhouse, Greene county: a destructive wind storm occurred at this place on the evening of the 13th. The damage to buildings, fences, and other property in this community is estimated at from \$15,000 to \$20,000.

White Hall, Greene county; between 5 and 6 p. m., of the 13th, a severe storm visited this place, which blew the roofs from buildings and caused other damage. In McDonough and Schuyler counties, the hail accompanying the storm was very large, and ruined the corn and grain crops in many localities.

Indiana.—Logansport, Cass county: telegraph lines, trees, &c., were prostrated in this locality by the storm of the night of the 4-5th.

La Fayette, Tippecanoe county: the wind and hail storm of the night of the 12-13th injured the corn and oat crops to a to a considerable extent in this county.

Indianapolis: the damage caused by the storm which visited this vicinity on the night of the 12-13th is estimated at \$50,000. South and west of this city the fields of growing corn were torn into shreds, and large tracts of trees were uprooted.

Vincennes, Knox county: the storm of the 13th proved very destructive in this county. Many promising fields of corn were entirely ruined, shocked grain and buildings were badly damaged, and stock killed.

Elkhart, Elkhart county: a violent storm visited this region during the afternoon of the 14th, uprooting trees, blowing down fences, and doing great damage to crops.

Iowa.—Burlington: a heavy wind storm, causing damage to trees and buildings, occurred at this place on the 5th.

Austin, Dickinson county: a heavy wind storm struck this place on the afternoon of the 11th, but caused no damage other than the blowing down of a few trees and outbuildings in the western part of the city. Reports from points northwest of this place state that considerable damage was done by the hail accompanying the storm.

Belle Plaine, Benton county: the severest storm of the season passed over this place at about 8.30 p. m. of the 11th. The track of the storm was about one-half mile wide, passing from west to east. The grain in the track of the storm was so badly damaged as to be not worth harvesting.

Council Bluffs: special dispatches from McPaul, Plum Hollow, Percival, and Hamburg, on the Kansas Central railroad, in Fremont county, state that a very violent storm of rain and hail visited those places about noon of the 12th. Wheat, corn, and grass crops were levelled to the ground and cut to pieces by the hail. The depot of the Kansas Pacific railway at McPaul was almost completely wrecked, and all of the windows of the town were broken. At Percival and Plum Hollow great damage was done by the wind and hail.

Waterloo, Black Hawk county: a severe storm passed over a part of this county during the evening of the 12th. At this place the storm was not particularly severe, but at points east and northeast, great damage was done to the growing crops. It is estimated that more than 1,000 acres of cereals in this

county are damaged to such an extent as not to be worth harvesting. Very large hail accompanied the storm, breaking windows and causing other damage. The storm extended to Jesup and Independence, and was about five miles in width.

Clinton, Clinton county: a very destructive hail and rain storm visited Clinton and Scott counties between 8 and 9 p. m. of the 12th, causing a large amount of damage to the growing crops, small buildings, fences, and trees. At Princetown, Scott county, about two hundred large trees were blown down. Hailstones of unusual size fell, covering the ground in places to considerable depths. The track of the storm, as near as can be ascertained, began north of Grand Mound, Clinton county, and followed the course of Wapsipinicon river, in an irregular southeasterly direction, to Princetown, on the Mississippi river. The width of the storm at Grand Mound was about four miles, and in Scott county it was about six miles.

Keokuk: the storm of the 13th raged with great violence southwest of this place. A train on the Chicago and Kansas City railroad was blown from the track near Browning, Missouri.

Des Moines: a severe storm prevailed at this place from 2 to 3.30 p. m. of the 16th; several houses were unroofed, and great injury was done to the crops in this vicinity. The wind reached a velocity of forty miles an hour. Reports from Audubon, Dallas, Jasper, and Marshall counties state that the storm was of great severity in those counties, and that much damage resulted from it.

Dubuque: during the night of the 22-23d this part of the state was visited by a severe wind and rain storm. Farmers reported heavy losses, many grain fields having been entirely destroyed by the wind and hail. Much damage has resulted from washouts on the Chicago, Milwaukee, and Saint Paul railroad.

Kansas.—Dodge City: a tornado occurred at Cimarron, a station on the Topeka and Santa Fé railroad, eighteen miles west of this place, at 4 p. m., of the 11th, wrecking a number of buildings.

Topeka: an unusually severe storm occurred at this place during the night of the 10-11th. The rainfall was very heavy, and caused much damage in the lower parts of the city. The Atchison, Topeka, and Santa Fé railroad track and yard were submerged, several houses were flooded, small buildings were moved from their foundations and the sidewalks were badly damaged.

Holton, Jackson county: during the night of the 10-11th, Soldier City, a town of about two hundred inhabitants, sixteen miles west of this place, was almost completely destroyed by a tornado. Four persons were killed and about fifteen were severely injured. The storm passed from north to south.

Atchison, Atchison county: the storm of the 13th proved very destructive in the northern part of this state, and in the southern counties of Kansas. In the river, at this place, a raft containing more than 400,000 feet of logs was torn from its moorings and the logs scattered. In Doniphan county dwellings and barns were unroofed, and corn-cribs and fences blown down. Near Iowa Point, in Doniphan county, a church and several houses were destroyed. At Pomeroy, Wyandotte county, a saw-mill was blown down and the machinery ruined.

Newton, Harvey county: about 4 p. m., of the 13th, a violent storm passed over Wakarusa township, about three miles south of this city, destroying the wheat fields and damaging other property.

Marysville, Marshall county: this place was visited by a tornado between 12 m. and 1 p. m. of the 13th. Thirteen of the most important business houses were unroofed, and the court house and jail were badly damaged. The city hall and a church were almost completely wrecked.

Wellington, Sumner county: at 5 p. m., of the 16th, a tornado of small extent occurred in Guelph township. A cone-shaped cloud, with an apparent diameter of seventy-five feet, descended from a heavy rain cloud, and striking the earth pursued a zigzag southerly course, destroying two houses and

causing other damage. At one place in the path of the tornado the earth was scooped out to a depth of three feet.

*Kentucky.*—Louisville: a heavy rain and wind storm occurred here on the afternoon of the 16th. The streets were flooded and rendered impassable. Several roofs were blown off, and many trees and signs were blown down. More than 2.00 inches of rain fell during the storm.

*Massachusetts.*—Williamstown: a violent storm swept through the Williamstown valley on the afternoon of the 6th, damaging the new college gymnasium to the extent of \$6,000. Many barns and trees were blown down.

*Michigan.*—Port Huron, 2d: on this date the schooner "S. L. Watson" was caught in a squall and dismantled, while six miles south of this place.

Cadillac, Wexford county: a violent rain and hail storm occurred here on the afternoon of the 16th, causing damage to buildings, fences, &c.

Eaton Rapids, Eaton county: at noon, of the 24th, a dwelling about five miles southeast of this place was destroyed by a tornado, and three of the inmates were killed.

Mason, Ingham county: a violent tornado swept over the southwestern part of this county on the 24th, striking the village of Onondaga, and demolishing several houses. A large amount of damage was done to fences and timber throughout the county.

*Minnesota.*—Graceville, Big Stone county: a number of buildings were destroyed in this vicinity by the storm of the 2d.

Belle Plaine, Scott county: the severest rain and hail storm of this season passed over this place at 8.30 p. m. of the 11th. The storm was of short duration, and caused much damage to buildings and crops. The course of the storm was from west to east, and its track was about one-half mile wide.

Lake Benton, Lincoln county: a heavy hail storm occurred at this place on the 12th. The course of the storm was from northwest to southeast; its path was one mile in width and six miles long. At Volga about three hundred windows were broken. Much damage was done to the crops.

Shakopee, Scott county: a heavy rain and thunder storm occurred at this place about 12.30 a. m. of the 20th. The storm passed from northwest to southeast, doing much damage to shade trees and crops.

Winona, Winona county: between midnight and 1 a. m., of the 20th, a violent thunder-storm from the southwest passed over this city. Along the river road, from Winona to Saint Paul, the storm was very severe. East of Winona the rainfall was very heavy and washouts occurred on the railroads near Salem. The storm extended westward to Dakota, and at some points it was accompanied by hail. Near Faxon, Sibley county, the storm was one of the severest ever experienced in that locality and hundreds of acres of crops were totally destroyed.

Northfield: a violent storm passed over the southern part of this state on the 21st. At this station, for about five minutes, the anemometer showed a wind velocity of seventy-two miles per hour.

Waseca, Waseca county: the tornado of the 21st struck this place at about 11 a. m., coming from a southwesterly direction. A large number of buildings were wrecked, and many trees were uprooted. The damage is estimated at \$10,000.

Kasson, Dodge county: at about 11.30 a. m., of the 21st, this section was visited by a violent tornado. A number of dwellings were destroyed and four persons killed.

Mantorville, Dodge county: during the storm of the 21st the court house at this place was unroofed, and numerous buildings at different points in the county were destroyed or damaged, and about twenty persons were injured.

Rochester, Olmsted county: a large amount of damage was done to buildings and crops at various points in this county by the storm of the 21st.

Lake City, Wabasha county: the commissioners of this county estimate the damage by the storm of the 21st to the bridges in this county at \$50,000. Numerous buildings were blown down or injured, and a large amount of damage was done to crops.

Elgin, Wabasha county: a tornado passed over this place at about 12 m. of the 21st, destroying more than \$50,000 worth of property. But few buildings in the town escaped without injury. Two persons were killed.

Wabasha, Wabasha county: the rainfall during the storm of the 21st was the heaviest that has been known at this place for many years. Many bridges on the railroads in this county were washed out, and the railroad tracks were also badly washed. The crops were damaged to a considerable extent by the hail which accompanied the storm.

Bird Island, Renville county: a heavy thunder storm accompanied by high wind passed over the southern part of this county during the morning of the 21st. The storm was accompanied by hail from the town of Camp to Fort Ridgely, Nicolette county.

Red Wing, Goodhue county: the storm of the 21st did great damage to the crops in this locality.

*Missouri.*—Saint Louis: at about 6 p. m., of the 13th, a heavy wind and rain storm occurred, causing much damage to property, both on the river and in this city. Two lumber rafts with 1,400,000 feet of lumber were driven from moorings down the river. The Missouri Pacific freight house and the asylum for the blind were unroofed, and many chimneys, signs, etc., throughout the city were blown down. The agricultural interests in Saint Louis county suffered seriously. Great damage was done to orchards and buildings. Trains were delayed in consequence of the debris which was strewn along the railroad tracks.

Wellsville, Montgomery county: at 4 p. m., of the 13th, this place was visited by a severe wind and rain storm, during which the public school building was blown down, entailing a loss of \$4,000.

New Hampton, Harrison county: fourteen buildings were destroyed at this place by the storm of the 13th. The fruit crop in this locality was badly damaged.

Webb City, Jasper county: the storm of the 13th resulted in damage estimated at more than \$50,000 in this county. The rainfall was very heavy, and caused the creeks and streams to rise suddenly and flood the lands adjacent to them. The lead and zinc mines between this place and Carterville were filled with water, necessitating the suspension of work for about one month, and throwing about one thousand men out of employment. At Joplin the rainfall is reported to have been the heaviest that has occurred since 1875. Willow creek, which runs through the southern part of this place, rose rapidly, flooding the houses along its banks and compelling families to abandon their homes. At Carthage, Jasper county, all of the valleys and lowlands were inundated.

Trenton, Grundy county: this place was visited by a violent wind storm at 2 p. m. of the 13th, which caused considerable damage. Many small buildings, fences, and trees in various parts of the city were blown down. The old First church was completely wrecked, and a school building was badly damaged. A part of the roof of the Chicago, Rock Island, and Pacific freight house was blown off. The losses in this vicinity are estimated at from \$20,000 to \$30,000.

Maldin, Dunklin county: a church, schoolhouse, the Masonic hall, and an unfinished hotel at this place were blown down during the storm of the 13th, entailing a loss of \$10,000.

Roseberry, Nodaway county: a heavy wind and hail storm passed over this locality at 1.30 p. m. of the 13th. At Wilcox, a small village in this county, nearly all of the buildings were injured.

Jefferson City: a part of the penitentiary building at this place was unroofed, and a number of chimneys blown down during the storm of the 13th. In the vicinity of Wyandotte, Kansas, much damage was done to orchards and fences.

Louisiana, Pike county: the most destructive storm that has visited this region for twenty years occurred here on the afternoon of the 13th. A large number of buildings were damaged, and the fishermen on the river lost their boats, fishing nets, &c. The injury to crops and orchards in this locality is very great.

Ashburn, a small village in this county, was almost entirely destroyed.

Sedalia: a severe storm visited this locality during the night of the 12th and 13th. In this city signs and trees were torn down and many windows were broken by hailstones.

New Cambria, Macon county: a severe wind and rain storm visited this section on the afternoon of the 13th, blowing down outhouses and sheds. The storm came from the northwest, and began about 3.15 p. m., lasting forty-five minutes. Trees and crops were seriously damaged.

Linneus, Linn county: the storm of the 13th did great damage to crops and buildings in this vicinity. A passenger train on a branch of the Chicago, Burlington, and Quincy railroad was lifted from the track and all of the cars were capsized. Twenty-one of the twenty-seven passengers were injured.

Saint Joseph: on the afternoon of the 13th a violent storm passed over this region. The first town in the track of the storm was Hamburg, Fremont county, Iowa, which was struck about 12m. The storm next visited Westboro', Atchison county, Missouri, where nearly all the buildings in the town were injured, and about ten were completely demolished. The storm reached Stanberry, Gentry county, about 1 p. m., where numerous buildings were blown down or otherwise injured. It is reported that at Burlington Junction, Nodaway county, not a building escaped injury. Main street was filled with the wrecks of buildings.

Carthage, Jasper county: this place was visited by a severe storm on the night of the 16-17th. Numerous buildings were struck by lightning and burned. Severe storms also occurred at Marshall, Saline county, and Warrensburg, Johnson county.

Ohillicothe, Livingston county: a heavy thunder-storm prevailed at this place from 11 p. m. of the 18th to 3 a. m. of the 19th. On the western horizon a dark cloud came up, from which there were continuous flashes of lightning. The cloud rose higher and higher, and was suddenly torn to small fragments with terrible detonation. The sound and the concussion were so violent that many buildings trembled as though shaken by an earthquake. Pictures fell from the walls and glassware in the sideboards was broken. During the storm many persons sought shelter in their cellars. Two barns were struck by lightning, set on fire and entirely consumed.

Nebraska.—Lincoln, Lancaster county: one of the severest storms of the season occurred at this place on the 13th. Several large brick houses in course of construction were levelled to the ground. At Louisville, Cass county, the crops were badly damaged by hail.

New Hampshire.—New Market, Rockingham county: violent thunder storms occurred at this place on the 4th and 5th, causing damage to buildings, orchards, etc. The lightning struck several buildings and killed one person. The storms of these dates are considered the severest that have visited this place for many years.

New Jersey.—Ocean Beach, Monmouth county: a severe storm of wind and hail visited this place during the night of the 12-13th, destroying a large barn and unroofing several houses.

Ashbury Park, Monmouth county: a very severe storm occurred at this place on the afternoon of the 23d. The wind blew with great force more than one hour, unroofing buildings and doing other damage.

New York.—Binghamton, Broome county: a violent storm of wind and rain visited this section on the afternoon of the 2d. Many large trees were uprooted and houses were unroofed or blown down.

Factoryville, Tioga county: between 3 and 4 p. m., of the 2d, a violent storm from the northwest passed over this region. Trees were uprooted, barns blown down, and roofs and fences carried away.

Buffalo: on the morning of the 3d a violent squall occurred during the passage over this city of a dark "V" shaped cloud. Although the cloud passed almost directly over the office building, the anemometer self-register did not show a greater veloc-

ity than thirty miles per hour for about two minutes. Two freight cars on the New York Central railroad were blown over, a few windows were broken, and other slight damages caused.

Albany: a violent thunder storm occurred on the 4th, causing damage between this place and Castleton. A heavy rain and hail storm visited the country about eight miles south of this place on the 5th. Trees and buildings were blown down and the crops much injured. The barge "Julia Lombard" broke from her moorings at Castleton, and sustained damage; and the steamer "Eagle," narrowly escaped capsizing.

North Carolina.—Kittyhawk: on the 10th, near Life Saving station, No. 10, a tornado prostrated nearly two miles of telegraph line. Some small buildings were blown down, and two large surf-boats were blown into the sea and lost.

Charlotte: reports from Greensboro', Guilford county, state that that place was visited by a violent storm on the evening of the 24th, which unroofed houses, and caused other damage to the town. At points south of Charlotte, in South Carolina, the storm raged with great violence.

Pennsylvania.—Wellsboro', Tioga county: during the evening of the 2d this county was visited by a destructive storm, during which the wind reached an estimated velocity of sixty miles per hour; many trees, fences, and small buildings in various parts of the county were blown down. Very heavy rain fell during the storm. Washouts occurred on the railroads, and bridges were washed away.

Wilkesburg, Allegheny county: this place was visited by a severe storm on the afternoon of the 6th. Damage to the extent of several thousand dollars was done in this vicinity.

Kittanning, Armstrong county: during the afternoon of the 6th, a violent rain and thunder storm passed over this place. Lightning struck numerous objects in the vicinity, causing much damage.

Reading: the storm of the night of the 13-14th was unusually severe. Fences were levelled and trees uprooted and stripped of fruit. In the lower part of this (Berks) county the storm was accompanied by hail.

Freeport, Armstrong county: this locality was visited by a severe storm of rain and hail on the 13th. A large quantity of hail fell, the hailstones being about the size of hickory-nuts. The storm was much severer at points west and south of this place, in Allegheny and Westmoreland counties, where the grain crops and orchards were seriously damaged.

Grampain Hills, Clearfield county: a heavy storm of rain and hail passed over this place on the evening of the 23d. The storm caused no damage at this station, but at points a few miles southwest buildings were unroofed and much valuable timber was blown down.

Leetsdale, Allegheny county: a severe storm occurred in this locality on the evening of the 23d, causing damage estimated at more than \$3,000. Many trees were broken down or twisted off, and several windows were broken by hail. A pier of the Pittsburg and Lake Erie railroad bridge near this place was washed away, delaying trains for three days.

South Carolina.—Wedgfield, Sumter county: during the afternoon of the 7th a severe storm occurred, which partly unroofed the depot of the Wilmington, Columbia, and Augusta railroad.

Tennessee.—Nashville: a heavy thunder storm occurred between 3.45 and 5.12 p. m. of the 5th, during which a maximum wind velocity of sixty-one miles was recorded. Trees, signs, &c., in and about the city were blown down.

Memphis: a violent thunder storm occurred between 8 and 9 p. m. of the 24th. For five minutes the wind blew at the rate of sixty miles per hour. The roofs of some buildings were blown off, and many telegraph poles and trees were prostrated. Near this city a box car was blown from the railroad track. The track of the Memphis and Little Rock railroad was obstructed by fallen tress, causing delay of trains. Some slight damage was done to crops and the river property.

Texas.—Fort Worth, Tarrant county: a destructive storm of wind and hail occurred at this place at about 3 p. m. of the



25th. The storm continued for more than one hour, blowing down a number of houses and trees.

*Virginia.*—Chincoteague: a severe gale occurred on the 24th, the wind reaching a velocity of forty-six miles per hour. A number of telegraph poles and one building were blown down at this place, and two sloops were capsized.

Petersburg: the counties adjacent to this place were visited by a violent storm during the night of the 5-6th. A number of buildings and other objects were struck by lightning, and orchard trees and telegraph poles were prostrated.

*Wisconsin.*—Milwaukee, 2d: a severe storm passed over Ozaukee county on the morning of this date, demolishing buildings at numerous points throughout the country. At Oakfield, the damage is estimated at \$15,000. At Necadah, a bridge over the Wisconsin river was damaged to the extent of \$4,000. The width of the storm was about two and one-half miles.

Eau Claire, Eau Claire county: a storm of considerable severity passed over this region during the night of the 12-13th, destroying much farm property at points south and west of this place.

Oconomowoc, Waukesha county: a violent wind and rain storm swept over this section on the afternoon of the 16th. No damage was done in the immediate vicinity of this place, but a violent tornado swept over the county about eight miles south, levelling everything within its path, which was about one-fourth of a mile in width.

Madison: the rain and hail storm of the 16th resulted in serious damage to the crops in localities adjacent to this place. At Syene, Lake View, and Oregon, the fields of corn were stripped and other grain was beaten into the ground by the hail. The damage to crops in Fitchburg township alone is considered to be from \$8,000 to \$10,000. In Madison the shade trees were injured and windows broken, but the damage was comparatively slight.

Fort Atkinson, Jefferson county: At 1.30 p. m., of the 16th, this place was visited by a violent tornado, which struck the town on the south side of the river, and passing eastward, destroyed a number of buildings; several persons were seriously injured. The losses are estimated at \$50,000.

Milwaukee: the storm of the 16th was very severe in this locality, and caused serious damage to various kinds of property. Numerous objects in and about the city were struck by lightning and more or less seriously injured.

Sussex, Waukesha county: on the 16th the town of Ottawa, about sixteen miles southwest of here, was visited by a storm of great severity. Large trees were twisted off and other damage done.

La Crosse: between 2.30 and 5 p. m., of the 20th, this place was visited by a most violent thunder storm. Two barns and one house were struck by lightning and burned; more than 2.50 inches of rain fell during the storm. Trains were delayed from six to eight hours on account of washouts. The storm was accompanied by hail as large as walnuts. A large amount of damage was done to crops in some localities.

Appleton, Outagamie county: the storm of the 21st did damage to the extent of \$200,000 in this city and surrounding localities. This storm was considered the severest that has ever visited this section. The rainfall was very heavy, and resulted in washing out nearly all the culverts in the city. At 3 p. m., of the 22d, a break occurred in the government canal at Kankanna, and more than one hundred and seventy-five feet of the embankment were washed away.

Mineral Point, Iowa county: at 1.30 a. m., of the 21st, a violent storm struck the village of Cobb, in this county, demolishing several buildings and causing loss of life. After leaving Cobb, the storm pressed eastward toward Dodgeville, where buildings were blown down and otherwise damaged.

Milwaukee: a heavy storm of wind and rain occurred on the 20th, during which the wind reached a velocity of forty-six miles from the southwest. The scow "Sea Bird," laden with lumber, was capsized.

Neillsville, Clark county: a severe storm occurred between

12.30 and 1.30 p. m., of the 21st, accompanied by very heavy rain. Streams rose rapidly, washing away several bridges in this vicinity.

Port Edwards, Wood county: the losses caused by the storm of the 21st at this place are estimated at from \$15,000 to \$20,000. Two persons were killed.

## NAVIGATION.

### STAGE OF WATER IN RIVERS.

The Mississippi river was highest at Saint Paul, Minnesota; Saint Louis, Missouri; and Cairo, Illinois, on the 1st; the month of June having closed with the water above the danger line at Saint Louis. It was highest and stationary at Memphis, Tennessee, on the 1st, 2d, and 3d; at Vicksburg, Mississippi, from the 6th to 12th; and at New Orleans, Louisiana, from the 9th to 15th. Between La Crosse, Wisconsin, and Keokuk, Iowa, the river was highest from the 26th to 31st; and lowest from the 13th to 22d.

The Missouri river was highest at Leavenworth, Kansas, on the 1st; at Omaha, Nebraska, on the 8th; and at Yankton, Dakota, on the 9th. At Omaha it was within ten inches of the danger line, when at its highest point on the 8th. The lowest stages were observed from the 28th to the 31st.

The Ohio river remained low throughout the month.

The observer at Augusta, Georgia, reports that on the 26th navigation was suspended in the Savannah river at all places above a point about seventy-five miles south of Augusta.

Navigation in the Cumberland river, at Nashville, Tennessee, was suspended on the 14th on account of the low stage of water.

The highest and lowest stages of water observed at the Signal-Service stations during July, 1883, are shown in the following table:

Heights of rivers above low-water mark, July, 1883.

Stations.	Danger point gauge.	Highest water.		Lowest water.	
		Date.	Height.	Date.	Height.
<i>Red River:</i>	<i>Ft. In.</i>		<i>Ft. In.</i>		<i>Ft. In.</i>
Shreveport, La.....	29 9	1	18 10	31	8 5
<i>Arkansas:</i>					
Little Rock, Ark.....	30 0	2	5 11	15, 16, 17	2 6
Fort Smith, Ark.....		13	9 2	13	2 7
<i>Missouri:</i>					
Yankton, Dakota.....	20 0	9	10 2	28 to 31	3 8
Omaha, Nebr.....	16 0	8	15 2	31	9 4
Leavenworth, Kans.....	21 0	1	19 8	31	11 11
<i>Mississippi:</i>					
Saint Paul, Minn.....	14 6	1	5 4	31	3 7
La Crosse, Wis.....	18 0	26	6 10	19	4 6
Dubuque, Iowa.....	21 10	27	12 6	13, 14	7 9
Davenport, Iowa.....	15 0	29, 30	9 11	14, 15, 16	5 8
Keokuk, Iowa.....	14 6	31	10 5	20, 21, 22	7 3
Saint Louis, Mo.....	30 0	1	32 1	29, 30	18 0
Cairo, Ill.....	40 0	1	38 9	31	19 5
Memphis, Tenn.....	31 0	1, 2, 3	31 2	31	15 7
Vicksburg, Miss.....	41 0	6 to 12	39 7	31	31 5
New Orleans, La.....	2 6	9 to 15	2 7	31	3 9
<i>Ohio:</i>					
Pittsburg, Pa.....	20 0	29	10 11	23	2 9
Cincinnati, Ohio.....	50 0	15	15 11	28	9 3
Louisville, Ky.....	24 0	1	8 1	30	5 8
<i>Cumberland:</i>					
Nashville, Tenn.....	42 0	18	8 9	30	2 4
<i>Tennessee:</i>					
Chattanooga, Tenn.....	33 0	1	4 1	31	1 5
<i>Monongahela:</i>					
Pittsburg, Pa.....	29 0	29	10 11	23	2 9
<i>Savannah:</i>					
Augusta, Ga.....	30 0	1	6 0	22	4 5
<i>Willamette:</i>					
Portland, Oreg.....		3	17 5	31	7 5
<i>Sacramento:</i>					
Red Bluff, Cal.....		1, 2	1 0	27 to 31	0 7
Sacramento, Cal.....		1, 2	10 10	29, 30, 31	7 9
<i>Mobile:</i>					
Mobile, Ala.....		4	17 9	26	15 3
<i>Colorado:</i>					
Yuma, Arizona.....		3	24 4	31	18 0

• Below bench-mark. ‡ Observations from 1st to 19th only. † Below high-water marks of 1874 and 1883.

## FLOODS.

Saint Thomas, Ontario, 5th.—Owing to the recent heavy rains, the creeks in this vicinity overflowed their banks, carrying away fences and bridges, and flooding lowlands. A washout.